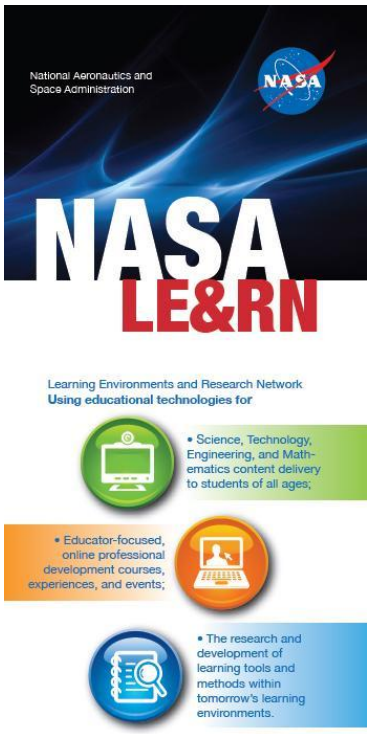
NASA LE&RN
2013 Annual Report

Administered by
OSU (DLN), GA TECH (ePDN), WJU (COTF)
Type of Agreement
3 Cooperative Agreements
Project Manager:
Dr. Robert Starr
Center:
NASA Langley Research Center
Telephone Number:
(757) 864 9492



PROJECT DESCRIPTION

The NASA Learning Environments and Research Network (LEARN) is a suite of three E-education activities within the previously established K-12 STEM Education Program. It provides distance learning opportunities to students and educators. LEARN also conducts research and development initiatives in educational technology. LEARN activities are the NASA Digital Learning Network™ (Oklahoma State University), The NASA-sponsored Classroom of the Future (Wheeling Jesuit University), and the NASA Electronic Professional Development Network (GA Tech). The project was transferred to the new OEID organization, and as such functions within the Dissemination and Web Services Team. Because COTF is nearing its end of performance period (Dec. 31, 2013) and ePDN's ends in Feb. 2014, the use of the LE&RN name has been discontinued in 2013. The DLN remains active through OSU while ePDN will continue limited services under a no-cost extension through FY14.

PROJECT GOALS

• Provide the NASA Office of Education with eEducation infrastructures used to inspire, engage, and educate K12 students and educators.

• Conduct research into existing and emerging learning environments and associated technologies.

• Plan, prepare, produce, deliver, and evaluate distance learning events that feature NASA-related research and missions.

• Collaborate with other NASA Education Projects to further the effective use of distance learning and online learning technologies.

PROJECT BENEFIT TO OUTCOME

Outcome 2: LEARN makes use of instructional technologies that overcome the barriers of time and distance to significantly increase the number of students and educators who are exposed to NASA-related STEM content. LEARN also conducts research into existing and emerging technologies to better inform the NASA Office of Education of their usefulness in meeting its goals and objectives.

Through DLN interactive module presentations of 46 static modules, special programs that include asynchronous presentations, and special events highlighting NASA missions and research, the DLN provides virtual dissemination of NASA content at low cost and high impact reach for the nation. We have partnered with NICE and have supported Rockets to Racecars in an effort to become the outlet to allow these groups to share their information with a wider populace of educators and students. Activities such as partnerships with Cinebistro Theaters have shown that mobile technology is a viable tool to bring distance education in to the field and relate to large audiences of students ePDN has created asynchronous and synchronous professional development courses.

PROJECT ACCOMPLISHMENTS

- LE&RN Achieved 100% Obligation of 2013 funding.
- LE&RN organized, hosted, and delivered OEID's first Virtual Retreat that engaged over 50 OEID staff across the nation in a two-day event facilitated in Adobe Connect.
- The LE&RN Project Manager was designated at CO-lead for the Dissemination and Web Services Team within OEID.
- Digital Badges for Lifelong Learners, and initiative of the McArthur Foundation and Mozilla, Inc., awarded developers assigned to work with NASA $150,000. In order to develop a digital badges system during the 2012-2013 pilot period in which a number of other organizations were chosen to do likewise. A Space Act Agreement was signed during the summer of 2012. The LE&RN Project Manager served as the chairman of the NASA group which includes Project Whitecard Studios INC, a Canadian Serious Games development company and the Center for Educational Technologies at Wheeling Jesuit University. The developers released in conjunction with NASA completed the pilot year and produced a website featuring the various badges produced during the project: http://astronautacademy.org
- The LE&RN Project Manager served as an invited juror for the Brock International Prize in Education. His nominee's educational innovation, www.NASAtalk.com (Dr. Laurie Ruberg of the NASA-sponsored Classroom of the future), was presented in a judging event in Tulsa, OK in Sept. 2013 along with 8 other jurors' nominees. While Dr. Ruberg did not win the $40,000. Prize, she gained significant benefit from the nomination which reflected positively on NASA Education.
- LE&RN produced a video for VA Space Grant that featured interns from Langley and Goddard as part of a statewide, industry/government partnership to promote Virginia internships. https://www.youtube.com/watch?v=MEttPNOJHaY

2013 Accomplishments by LE&RN Activities(COTF, ePDN, DLN, Rockets to Racecars)

COTF Accomplishments

http://www.cet.edu

- COTF maintained 24/7 operations and programming of NASA's DLiNfo Channel http://www.nasa.gov/offices/education/programs/national/dln/webcast/webcast.html.
  - Conducted teleconferences for the NASA Streaming Group, Ames, JPL, JSC, MSFC, GSFC, KSC, JSC, Stennis, and COTF to support pre-college teacher professional development and K-12 student education.
  - During December 2012, NASA DLiNfo Channel moved office operations from the CET building to the NTTC building on the campus of Wheeling Jesuit. Technical operations remained in the CET. Dec 2012 was devoted to addressing necessary maintenance on the video server.
  - DLiNfo Channel: Students: 213,629 Educators: 149,708
  - LIVE Webcasts: 350
- COTF/CET contributed to the NASA collaboration portion of the Digital Media and Learning Badges for Lifelong Learning Competition with a proposal title: Badging Project: Robotics and STEM Badges Using NASA Content submitted collaboratively by CET and Project Whitecard Studios, which was selected for funding by Mozilla and the MacArthur Foundation. CET developed a website to feature its NASA-related badges: http://badges.cet.edu
  - LEARN DLiNfo and NASATalk make use of instructional technologies that overcome the barriers of time and distance to significantly increase the number of students and educators who are exposed to NASA-related STEM content. NASATalk also conducts research into existing and emerging technologies to keep NASA Office of Education informed of the potential impact and usefulness of new educational technology tools and pedagogical strategies and how they can be used to achieve program goals and objectives.
  - Students at museums and science centers across the country recently participated in a unique video conference, hosted by NASA's Digital Learning Network. Comments from educators (provided below) reflect the impact of the NASA DLiNfo live streaming programs:
    a. "This video event was a unique and engaging experience for our participants," said Arin Casavant, of the Gateway to Science Center in Bismarck, N.D. "Even though we are in a small city, over a thousand miles away, we could still connect with NASA."
    b. "Connecting with NASA was a special treat for summer camp students at the Edgerit Explorit Center, in Aurora, Neb."
  - Here is a summary-level of programming events supported by COTF for DLN or featured on the DLiNfo channel in the 2013 fiscal year.

a. World Space Week (GSFC & JPL);
b. NASA NICE, NASATalk, ETE-GCC, and Climate Change Education resources for educators (LaRC);
c. Lunabotic mining competition (KSC);
d. Aerospace Engineer – Nicole Smith (GRC); Astronaut Bob Cabana (KSC);
e. Neal Armstrong's Memorial Service.
f. NEON Webinar, "Mars and Earth Compared: Life on Other Worlds?" at PSU with support from NASATalk.
g. What is an Inflatable Reentry Vehicle Experiment? (LaRC)
h. Space Shuttle Atlantis permanent home (KSC)
i. NASA Educational Resources You NEED (JPL)
j. Teaching from Space Astronaut Downlink with NASA DLN Space program from COTF with Weller Elm, School, Ashburn,VA
k. Exoplanets?, IGES
l. Space Grant students Presentations, Arlington, VA
m. Planetary Play-Doh: Solar System Scale Model, PSU with support from NASATalk
n. Advanced technologies, Mission needs and Space Flight (GRC)
o. NASA NES and LANDSAT? (GSFC)
p. Tuskegee in the Troposphere: Conquering Contrails, LaRC
q. Solar Energy Impact! with JSC
r. NASA Explorer Schools (Wallops)
s. Space Grant Project Presentations (LaRC)
t. Climate Change Special with the EPA (JSC)
u. First three steps of the Engineering Design Process, AESP
v. Earth Observing Satellites, NES
w. Icy moon - Saturn's Titan and Jupiter's Europa (JPL) with support from NASATalk
x. NASA NEEMO Program (KSC)
y. NASA Explorer Schools, Kristy Hill, NES Education Specialist at MSFC
z. Venus Transit from GRC, which included 10hrs of live programming with 106,931viewers for the DLiNfo Channel
aa. Start your engines! (Parts I, II, III, IV of a series) (LaRC)

- Below is a summary of middle school educators (MSE) and middle school students (MSS) who accessed these programs on a monthly basis.
  a. Oct 2012 – MSE: 17,298; MSS: 25,947.
  b. Nov 2012 – MSE: 23,172; MSS: 34,758.
  c. Dec 2012 – MSE: 1,505; MSS: 4,258.
  d. Jan 2013 – MSE: 1,665; MSS: 1,665.
  e. Feb 2013 – MSE: 6105; MSS: 6158.

f. Mar 2013 – MSE: 6333; MSS: 6340.
g. Apr 2013 – MSE: 1503; MSS: 2245.
h. May 2013 – MSE: 43,185; MSS: 65,052.
i. Jun 2013 – MSE: 43,887; MSS: 65,830.
j. Jul 2013 – MSE: 5,055; MSS: 1376.
k. Aug 2013 – MSE: not available; MSS: not available.
l. Sep 2013 – MSE: not available; MSS: not available.

ePDN Accomplishments

http://nasaepdn.gatech.edu

NASA's Electronic Professional Development Network (ePDN) offers fREE online professional development certificate programs for K-12 teachers in Robotics and Project-Based Inquiry Learning Certificate courses that are hands-on, interactive, and infused with NASA content. Each certificate program consists of four courses, totaling at least 52 hours of instruction. All courses can be submitted to school systems for Continuing Education Units to use towards recertification requirements.

- 2 PBIL and 2 Robotics courses were successfully completed. 196 educators participated in PBIL courses. 214 educators participated in Robotics course. Total: 410
- Throughout the summer and fall the ePDN team began offering training in the use of the NASA Electronic Professional Development Networks Moodle Learning Management System (LMS) hosted by Moodlerooms to NASA Education Specialists.
- Provided introductory training sessions in the Moodle LMS to 65 NASA educators
- The NASA Virtual University (NVU) was created within the Moodlerooms environment
- Conducted one-on-one training sessions at the educators' requests
- A course template was established for sandbox requests
- Follow up webinars and online office hours were held to assist the educators in building courses and learning modules
- A no-cost extension was approved to continue the training through February of 2015.
- Several courses were developed and one finalized and offered to educators associated the Rockets to Racecars activity.

DLN Accomplishments

http://dln.nasa.gov

- The DLN Project Office at Langley organized an event that celebrated its 10th Anniversary in Sept. 2013 in the form of a virtual birthday party involving current and past DLN staff and supporters. All 10 DLN studio were connected for the "party." http://dln.distanttemples.com
- ISS Downlink: Music in Space with Astronaut Chris Hadfield
- he GSFC DLN Education Specialist was awarded the Center Director Peer Award for Outstanding Customer Service
- The DLN participated in a professional development event with Headquarters to present opportunities to educators in Bermuda as part of an exchange with the Dept. of Education there. Bermuda has a NASA tracking station on site, and the agreement extends to collaborative educational activities. The DLN was used to connect NASA with about 30 educators at the Ministry of Education.
- "Newton's Laws in Bowling and NASA" – Cinebistro Theatre in Hampton, VA hosted 200 students to connect with NASA to interact directly with Dr. David Way, Lead Engineer for the Entry, Decent, and Landing (EDL) of the Curiosity Mars Rover.
- Several DLN members engaged in graduate work . One (GSFC) earned a Masters Degree and one (LaRC) finished doctoral course work and is now ABD.
- KSC DLN originated several webcasts associated with distribution of retired Space Shuttles to Museums/Science Centers
- MSFC Education Specialist participated in a sponsored-travel invitation to Space Camp Turkey to serve as a keynote speaker.
- The number of specific connections with schools, organizations, and groups is too large to publish in this report. The DLN conducted thousands of distance learning/online events during FY2013

Rockets to Racecars Special Project (DLN) Accomplishments

http://www.nasa.gov/offices/education/programs/national/dln/special/R2R_Ed_Res.html#.UqIuncRDuAg

The R2R program highlights the correlations between the science of flight and racing, and educates the public about the many NASA technologies that are currently used in the racing industry. The program focuses on Teacher Professional Development delivered both through the DLN and face to face at unique locations near racetracks. These experiences provide teachers with training and experience delivering the activities using the train the trainer model.

- Activity reach was extended to include building of industry and academic affiliations. Associate Administrator, Leland Melvin participated in event at Richmond International Raceway at the invitation of Virginia 529 College Savings Plan. While there he was able to engage teachers in NASA education activities and address fans at the event, and those watching on television, delivering information of NASA missions and education initiatives.
- Activity was able to exceed the proposed goal by leveraging support from private industry and academic affiliations to include Space Grant and US Dept. of Education.
- 13 of the listed events were by invitation from external organizations/ industry partners – A total of 874 educators were reached through R2R EPD activities
    a. 21st Century Community Learning Centers
    b. 4-Part PD series - April
    c. 4-Part PD Series - July
    d. Astronomy Days at NCMNS
    e. Celebrate LADEE at RIR
    f. Celebrate Science Indiana
    g. Destination Imagination Global Finals
    h. Homeschool Days at Virginia Living Museum
    i. Intrepid event – New York – Delivery of Space Shuttle
    j. Lynchburg City Schools PD workshop
    k. Modeling-Simulation workshop - Langley
    l. NASA Educators Working in STEM/North Carolina
    m. Pre-service Teacher Institute
    n. VA Aerospace Education Days
    o. VA Children's Engineering Council
    p. VA Council for Teachers of Mathematics

PROJECT CONTRIBUTIONS TO APG MEASURES BY LE&RN Activities

DLN

Overall during FY12 the DLN reached 143,380 students and educators while during FY13 that number reflected 127,177 - a decrease of 11%. A variety of factors could have influenced this number including cuts in education staff, a staff absence for one center, several large storms during the year that cut off several regions to our services for extended periods, and deleterious cuts in the overall DLN budget that prevented further outreach. As OEPM survey data entry was removed with regards to student and educator surveys due to OMB requirements, there is no data to correlate from this source the quality of programming. However, in an independent survey conducted by OSU to measure the projects effectiveness, and in the report In 2010 we asked an open-ended question about the value of the DLN. Teachers replied that it was an amazing opportunity (42%), great enrichment (18%), very organized (13%), that it increased student interest (13%), and that the presentations were great (12%).

We took these responses and others mentioned by fewer people and asked 2011 and 2012 participants to rate the value of each area. In 2011, the majority of DLN users rated all the areas an eight or higher on a scale of 1-10. Highest rated was its free cost (9.7, 9.5), followed by its enrichment of the curriculum (9.4, 9.1), how interesting and educational (9.3, 9.2), engaging (9.3, 9.1), organized (9.2, 8.9) the events are. Also rated highly by the majority of the users was how the events increased student interest (9.2, 8.9), provided them with an amazing experience (9.3, 9.1), exceeded expectations (9.1, 8.8), and as an excellent STEM program (9.0, 9.0). We also asked educators to rate the effect of DLN on their students using a scale of 1-10.

Educators responding to the survey in all three years rated the effect on students highly in all areas: interest in STEM topics (8.9 in 2010, 8.2 in 2011, 8.5 in 2012), interest in STEM careers (7.9, 7.8, 7.8), engagement in DLN activities (8.9, 8.6, 8.6), engagement in other STEM activities (8.2, 8.0, 8.1), questions about STEM topics (8.2, 7.9, 8.1), and knowledge about STEM topics (7.9, 7.7, 8.0).

In FY13 the DLN reached **11,638** educators and **111,539** students. .

COTF

- DLiNfo Channel: Students: **213,629** Educators: **149,708**
- LIVE Webcasts: **350**
- NASATalk.com: Logged **17,569** visits from **14,920** unique visitors who viewed **33,588** web pages. Almost all visitors are teachers or NASA education developers.

ePDN

- **410** educators took ePDN courses in 2013

Rockets to Racecars

- Total number of educators reached: **874**

IMPROVEMENTS (e.g. project management, efficiencies, etc.) MADE IN THE PAST YEAR

2013 was a year of transition for the LE&RN Project from its former home in the K12/eEducation Program to the Office of Education Infrastructure Division. It was also a year of budget cuts and activity phase-outs (COTF) that affected productivity, especially in the ePDN activity. Adapting to new organizational requirements and expectations required considerable time and readjustments. Additionally, the transition of the NASA Portal to a new contract posed a number of challenges that resulted in continuous interactions with new programmers and IT managers. It has yet to be seen if improvements have been made with the move to an open-source content management system because the DLN website is not fully transitioned to the new system yet.

OSU was tasked to handle a variety of items that freed up DLN Education Specialists time to focus on module development and delivery. These tasks included: scheduling of events, test calls with customers, OEPM crosscheck and input for Project Activity Forms, and rescheduling events when cancellations occurred. Additionally, from the OSU survey data ad hoc teams were formed to specifically address customer and team concerns and comments to improve the DLNs overall operation.

This allowed for the team to provide greater input and increased their commitment to the success of the project. Our hands were tied with budget cuts that forced us to deny equipment upgrades which hindered some of our operations. Staff meetings were changed to monthly from our normal bi-monthly meetings with months alternated to accommodate regular staff meeting items and professional development needed due to travel budget elimination.

Modules were evaluated for sunset based on requests and quality. Additional modules were set for major revisions based on changes within the agency. The OSU DLN staff at the college helped DLN education specialists maintain validity with their PAF updates quarterly and as a result all reports were in early and verified. The Rockets to Racecars projects added dimension to our offerings and allowed the public a better understanding of the connection between the science of NASA and racing. Partnership with the NICE program added a key element to educator professional development with the DLN and provided a model for EPD to launch their use of DLN services. The use of the Agencys VIDYO services opened the door for the DLN to provide high-quality videoconference connections using a computer, webcam, and speakers. This allowed schools that did not have the means to purchased H.323 equipment (Tandberg or Polycom systems) to connect with us for the first time and for us to use the medium to connect to our studios. Module descriptions were then altered to indicate which of them could be presented in web conference or video conference format.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT

COTF

COTF has improved the DLiNfo Channel by adding 475 new video program elements to the webcast channel that are subject specific and STEM based. COTF added an additional high definition video conferencing system to expand the programming outreach, which allows COTF to provide a dual stream on two different web providers (NASA ETouch/Akamai contract and NASA's Ustream Super Channel). COTF added special programming outreach for NASA Projects like NASA NICE, AESP, NES, First Robotics, LunaBotics, Inspire, IGES, Teaching From Space, NASA Education Stakeholders Summit, and NASA CORE. COTF also expanded the DLiNfo Channel's public outreach by over two hundred percent.

To support effort to badge NASA STEM education activities, NASATalk facilitated collaborations between NASA leadership, Robert Starr and Daniel Laughlin, Khal Shariff from Project Whitecard (Winnipeg, Manitoba, Canada), and Chuck Wood and Meri Cummings with COTF. NASATalk provided virtual space for a private collaborative for the planning discussions and public space for promoting badging activities as they became available

NASATalk expanded its support for NASA education and LEARN live professional development events by including these live events as part of the front features page. Audiences were able to jump into the live events by simply selecting the USTREAM DLiNfo web stream of the event posted on the NASATalk

front page. Aerospace educator NEON and NASA Explorer School webinars as well as DLN education programs were featured regularly as NASATalk frontpage featured events.

An outcome of NASATalk promotion of climate science and sustainability was a funding award from the SPROUT Foundation (Pittsburgh, PA) in September 2013 to two school districts (South Fayette and Fort Cherry) in Pennsylvania who are applying ideas and curriculum presented in NASATalk to their students. This award funds the integration of plant science and hydroponics activities at the K-4 level in both school districts.

ePDN

Georgia Tech receives NSF grant *AMP-IT-UP* with ePDN instructors

Georgia Tech, in collaboration with the Griffin-Spalding County School System, was awarded a $7.3 million NSF Math/Science Partnership grant entitled *Advanced Manufacturing and Prototyping Integrated to Unlock Potential (AMP-IT-UP)*. The 5-year project begins October 1, 2012 and will design, implement and evaluate an array of advanced manufacturing-focused experiential learning programs design to make explicit the inherent science and mathematics. The aim is to increase student engagement and interest in STEM, develop 21st Century Skills, and improve science and math achievement.

The following NASA Electronic Professional Development Network (ePDN) staff are part of AMP-IT-UP: Marion Usselman (co-PI), Meltem Alemdar (co-PI), Jeff Rosen (co-PI), Mike Ryan, Storm Robinson, Sabrina Grossman, Doug Edwards, and Tony Docal. Connections to the ePDN will be actively pursued.

DODEA

The NASA Electronic Professional Development Network (ePDN) has formed a partnership with the Department of Defense Education Activity (DODEA) Domestic Dependent Elementary and Secondary Schools (DDESS). Several of their teachers are currently taking our Robotics and Project-Based Inquiry Learning (PBIL) certificate courses. A teacher at Quantico is participating in the PBIL series.and is already applying what she has learned to her teaching. "I am one of the lead teachers for STEM in our district and these courses are helping me feel much more comfortable in that leadership role. DoDEA will be hosting a STEM week April 30-May 4 in which every student across the world will be "engaged in a STEM PBIL activity." I will be teaching 6 classes of students during my prep times to achieve our school's goal. These courses have been beneficial to me as I continue my journey into STEM experiences! Thank you for all of your help to the staff of DoDEA! We appreciate you!"

Georgia Race to the Top

Georgia Tech's Center for Education Integrating Science, Mathematics and Computing (CEISMC), one of the three partners who work on the NASA ePDN, have signed a contract for their work on Georgia's

Race to the Top program. The Race to the Top program is offering professional development courses on Robotics and PBIL to Georgia STEM teachers each semester that are based on the ePDN model.

DLN

The DLN continued its collaboration with Skype in the Classroom allowing us to post events on the organization's website and tap into their 30,000+ registered educators. Skype hosts the website and promotes NASA opportunities worldwide.